REMARKS

Reconsideration of the above-identified application in view of the remarks following is respectfully requested.

Claims 1-2 are in this case. Claims 1-2 have been rejected. Claims 1-2 have been amended. New claims 3-14 have been added.

35 U.S.C. § 102 Rejections – Pitkow

The Examiner has rejected claims 1-2 over USC 102(e) as being anticipated by Pitkow et al (US Patent No. 6,396,819). The rejections of the Examiner are respectfully traversed.

Pitkow teaches a method for displaying in a coherent manner the changes to a web-site's structure, usage and content over time. A related series of graphs, preferably tree graphs, are generated and displayed as a cylindrical tube called a "time tube". The length of the "time tube" is formed from several planar "slices", each representing the state of the web-site at a certain time point. According to the method taught by Pitkow, a general graph is turned into a tree graph according to a property of the system portrayed by the original graph. For example, if the original graph represents the pages in a web site and the links between them, the property used for generating a tree may be a page usage parameter. The property is used in order to determine the order that different nodes in the original graph will be added to the tree as it is being generated. In addition, Pitkow teaches the creation of an inventory of all the nodes that existed in any time-point in any of the generated graphs. The inventory is then used to produce a layout template, in which each node is assigned to a unique layout position. This layout template is in turn used to display each of the tree-graphs in the "time tube", such that each of the nodes in the tree is located in its respective position assigned according to the layout template.

In another aspect of the teachings of Pitkow, corresponding nodes in different planar "slices" of the "time tube" are linked in response to a user request. The user may view the temporal changes in the graph or web-site by traversing the length of the time tube, and may also view the state of the graph at a specific time point by selecting a specific planar "slice" and viewing that slice separately.

The present invention is directed at providing a method for using a multi-spline model for data mapping, and particularly for efficiently transmitting data over a network. Three-dimensional data may be mapped to a model in which one dimension is time, and may then be transmitted to the user only as required. Data that is expressed in spatial coordinates may be mapped to a single multi-spline tree by converting the spatial coordinates into time-based coordinates. The data mapping onto the multi-spline tree is then performed at least partially according to the generated time-based coordinates.

The invention of Pitkow is directed at providing a method for a more clear display of transformed data, which is specifically suitable for data transformations that can be represented in a series of graphs, as is described in the title of the invention. Each of the graphs represents the state of the data at a certain point in time, and is turned into a tree format according to some known algorithm such as Breadth First Search (BFS) or Depth First Search (DFS) and according to a property of the graph, such as a priority parameter of each node. Therefore, in order to display a temporal transformation to a system or graph, <u>a series of several trees (graphs)</u> must be generated. This is clearly evident in Pitkow, column 2 lines 40-41 "the states of a graph at various times are represented as <u>a series of related graphs</u>".

In the teachings of Pitkow, the generated trees are displayed in a disk format, where the root of the tree is the center of the disk, and the leaves are on the peripheral area of the disk. The nodes of the tree are set to unique locations according to an inventory of all the nodes that had existed at any point in time. The trees representing the different points in time are then stacked to form a cylindrical tube, called a "time tube", such that corresponding nodes are connected between them. Since each planar slice represents the state of the visualized system at a certain time point, the tube allows the user simple visualization of how the data was transformed during time. This can be found in the teachings of Pitkow, column 16 lines 35-43: "Time tubes exist in a three dimensional work space and are created by stacking and aligning two-dimensional circular slices (such as disk trees) into a cylindrical representation, similar to a log. Each disk tree is a visual representation of the data during a stage of the transformation. The resulting visualization allows the user to see how data were transformed from one point to another."

It is clear that in the invention of Pitkow, time is represented in the length dimension of the time tube, and not in each disk tree in itself. Each disk tree is a "still" picture of the state of the viewed system in a certain point in time, and only the collection of all the disk trees together into a time tube provides the temporal visualization of changes occurring in a system as it taught by Pitkow. In addition, the use of a spline is not taught or mentioned in Pitkow.

By contrast, the present invention is directed toward mapping data over time to a single multi-spline tree model, for example for greater ease of representation and/or transmission of data. In the method taught by the present invention, the tree generated is a complex tree, as each of the nodes is a spline, which is in itself a complex function. A time parameter is associated with each node, such that a temporal progression is represented by traversal along the spline tree. With regard to these ideas, the specification of the present invention states in page 5 line 20 bridging over to page 6 line "the multi-spline tree features a plurality of nodes, each of which is a spline ... This tree of splines can be transferred to a geometric model. The information provided by the multi-spline tree enables the model to be manipulated. For example, the data can be more efficiently modeled, and hence more efficiently transferred, according to the assignment of data to a particular branch of the tree, the distance from the node to the root of the tree, the determined time parameter for each node, and so forth".

Moreover, in the present invention time is represented within the tree itself, such that traversing the splines in the multi-spline tree is equivalent to movement in time, as taught in page 11 of the present invention, lines 9-18: "moving along a spline is simply moving forward or backward in the time parameter of the spline...the three dimensional data is mapped according to the time parameter of the spline. When the user navigates along the spline and advances in time, the data is sent to the user by a server according to that time..." Hence, the in the present invention time is represented within the single tree, by moving along the splines. Therefore, it is clear that the method of the present invention is distinct in goal, method of implementation and representation of time from the teachings of Pitkow.

In addition, although disk trees are used in the teachings of Pitkow in order to form the time tube, while the present invention makes use of a multi-spline tree to which the data is mapped, the method of generation of the tree that is used is not the

same in each of the inventions, nor do the trees represent the same or even similar concepts.

Pitkow teaches the generation of a tree graph from a general graph, by using a Breadth First Search (BFS) algorithm or a Depth First Search (DFS) algorithm, modified such that nodes are added to the tree according to a usage parameter, which are described with regard to figures 9-14 in the specification of the invention. Pitkow also teaches a method for displaying the tree graph in a disk shaped format, described with regard to figures 17-20 in the specification of Pitkow.

By contrast, the present invention teaches the use of a plurality of single splines in order to build the multi-spline tree of the present invention. This is done in several stages, each time adding on a spline to the forming tree, and verifying that it withstands certain parameters within the tree. The complete process is shown in figure 1, and is described in page 7, lines 1-15: "The multi spline is generated from a set of a plurality of single splines, the first of which is considered to be the "root" of the tree...this root node is stored as a whole node, preferably after being reparameterized by distance...Each subsequent spline, loaded after the first root node, is then added on to the tree according to the following stages. First ... the distance of the first key point from each of the existing spline nodes is determined for the new spline...this distance is used to determine the branch which is most likely to contain this new spline...the first key point of the new spline is moved to be placed exactly on the located branch, at the appropriate time parameter...The derivate of the new spline is taken from the derivate of the branch at that point, in order to continuously expand the branch. The joint for the new spline can optionally occur at either the mid-portion of a branch or alternatively at the end of such a branch. This process is preferably repeated until all of the splines have been added to the multi-spline tree".

It is clear that the process of creation of the tree used by the present invention is not based on an original structure of a graph (as the tree is not a graph, but a multi-spline model), and is determined according to the time parameters and the mathematical properties of the splines already in the forming tree, as opposed to the DFS and BFS methods used by Pitkow in which the structure of the tree depends on the structure of the original graph.

The process taught by Pitkow, of convenient and easy display of the temporal changes to a web-site cannot be achieved by using the present invention, since as

mentioned above the multi-spline tree is a very complex construct. Any attempt at using a multi-spline tree for display of the temporal changes to a web-site would result in complicating the display mode of the changes, rather than simplifying them. Similarly, efficient transfer of data in a network as taught by the present invention could not be accomplished using the method taught by Pitkow, as a representation of temporal changes using many disk tree graphs is limiting to display only systems that may be mapped to a graph. In addition, the method taught by Pitkow results in a large amount of data to be transferred, as it creates a separate representation of the whole system for each time point, and would therefore not decrease the amount of data to be transferred using little bandwidth, and would be inefficient for the purpose of data transfer.

Therefore, there are a number of crucial differences between the present invention and that of Pitkow, certain of which are listed below.

First, Pitkow uses a <u>plurality</u> of tree graphs in order to conveniently display the changes occurring in the usage and structure of a web site over time. Therefore, the method taught by Pitkow may only be used for systems that can be represented as a graph. The present invention is directed at providing a method for efficient transfer of data in a network, by mapping the data to a <u>single</u> multi-spline tree.

Second, in the teachings of Pitkow, time is represented in the length of the time tube formed from a plurality of disk trees, whereas in the present invention traversal of the multi-spline tree is equivalent to movement in time.

Third, Pitkow does not teach or suggest the use of a spline for the representation of temporal changes, but rather uses a plurality of two dimensional disk graphs representing a system, stacked one over the other, such that time is represented in the third dimension, the length of the resulting cylindrical tube.

However, in order to further point out the distinctions between the present invention and the teachings of Pitkow, claim 1 was further limited by adding the specification that a <u>single</u> multi-spline tree is created by the method of the present invention.

35 U.S.C. § 102 Rejections – Naka

The Examiner has rejected claims 1-2 over USC 102(e) as being anticipated by Naka et al (US Patent No. 6,222,560). The rejections of the Examiner are respectfully traversed.

Naka teaches a system and method for transmitting and receiving three-dimensional skeleton motions, in two possible formats. In the first format, initial information and time series data is interpreted to decide the posture of the skeleton structure according to kinematics, and in the second format the initial information and disassembled element data, in combination with connection methods, is interpreted to decide the posture of the skeleton structure according to kinematics.

According to the teachings of Naka, there are two possible formats for transmitting motion data of a skeleton structure.

The first transmission format comprises transmitting the motion data in a time series, in which the skeleton is viewed as a hierarchy in a specific coordinate system, defined relative to the root of the hierarchy. The hierarchical initial state contains information regarding the hierarchical relationship of joints, but the hierarchical initial states are set to include other information as well, such as the initial direction of the lengths of the arms and legs and movement ranges of the joints in the local coordinate system. The motion data regarding parts of the skeleton required to move is given as a time series data of the location of these parts in a three-dimensional space according to the local coordinate system. In this form the data is transferred to a receiving end, and is then interpreted to display the motion of the skeleton using kinematics methods.

The second transmission format taught by Naka comprises transmitting basic motions which characterize the motion in a three-dimensional virtual space. The basic motions are transmitted together with information detailing how they should be connected. In this transmission format, virtual sub three-dimensional spaces that divide the three dimensional action space into segments are estimated. The motion is transmitted by transmitting the state of the virtual sub-space at the starting point of the motion, at the end point of the motion, together with the interpolation method. An interpolation method that can possibly be used with the teachings of Naka is spline interpolation.

The object of the present invention was previously described. Briefly, the present invention is directed at providing a method for mapping data to a single multi-spline tree, such that temporal information would be mapped to a specific location in the spline tree.

In the teachings of Naka, a hierarchy based on a specific set of coordinates is used for transmitting the data in a time series according to one transmission format, but no splines are used in this process. Spline interpolation is used when transmitting data according to basic motions, which are then connected together to form a smooth motion of the skeleton by using an interpolation method, optionally spline interpolation. Therefore, in the teachings of Naka, the transmission of data according to temporal information is not accomplished by using splines, but rather splines are used in a different format of data transmission. In the second format of data transmission, the data is not transmitted according to a time series or according to a hierarchy, but according to segments that are later connected.

By contrast, in the present invention temporal data is portrayed within a multi-spline tree, and thus a hierarchy and splines are used for displaying the temporal information about the data being transmitted. In addition, the use of splines in the present invention is not for interpolation of partial graphic images of a system or an organ, but rather for displaying time along the curve of the spline, as described in greater detail above. The present invention specifically teaches the use of splines within a tree structure, as an integral part of the tree structure and the data analysis related to the tree structure. However, in the teachings of Naka, spline interpolation is an optional interpolation method, which is used when the skeletal motion data is not transferred in a time series related to a hierarchical structure. In fact, transmission of basic motions which are then connected by using spline interpolation is a transmission format that <u>replaces</u> transmission in a time series. The two different transmission formats, transmission in a time series and transmission of basic motions, are not used simultaneously or for the transmission of one set of data, but rather one of the transmission formats is chosen and that format is used for transferring the data. The recipient of the transmission then interprets the received data according to the transmission format that was used. Therefore in the teachings of Naka, there is no use

of splines in combination with hierarchical structures or with representation of time. Therefore, it is clear that the present invention is distinct from that of Naka

In view of the above remarks and amendments it is respectfully submitted that claims 1-14 are now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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